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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,140	10/09/2003	Jeong-Rok Kim	3430-0193P	6455

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EXAMINER	
NGO, HUYEN LE	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 03/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)	
10/681,140	KIM ET AL.	
Examiner	Art Unit	
Julie-Huyen L. Ngo	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-32* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *09 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Species A (claims 1-20, 22-25 and 29-32; Fig. 6) in Paper on December 05, 2005 is acknowledged.

Applicant's arguments regarding the restriction requirement have been considered. The restriction requirement is hereby withdrawn and all claims are being examined as follow:

Response to Amendment

The amendment filed September 20, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material that is not supported by the original disclosure is as follows:

In claims 4-10, five different sputters and masks form different elements of the Liquid Crystal Device.

Applicant is required to cancel the new matter in the reply to this Office Action.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the chamber, the target and the magnet recited in at least claims 11 and 26 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

In claims 4-10, the second to the fifth sputters and masks. It appears from the original disclosure, the different layers of the liquid crystal device are formed using only one sputter, the same sputter. See paragraph 38.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10, 14-20, 29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan et al. (US6057903A) in view of Tanaka (US5824197).

With respect to claims 1, 2 and 14, Colgan et al. teach (Figs. 1-2, col. 4, line 25 to col. 5, line 55) a method of fabricating a liquid crystal display device comprising the following steps:

- forming a gate line 32 on a first substrate;
- forming a data line 31 crossing the gate line;
- forming a switching element (TFT 30) connected to the gate line and the data line;
- forming a pixel electrode 26 connected to the switching element;
- forming a black matrix 23-n on a second substrate using a sputter to deposition,
- forming a ITO common electrode 28 on the color filter layer; attaching the first and second substrates such that the pixel electrode faces the common electrode; and
- forming a liquid crystal layer 36 between the pixel electrode and the common electrode.
- forming a color filter layer on the black matrix

Wherein

Claim 2:

- the black matrix includes chromium (Cr) and chromium oxide (CrOx, col. 7, lines 24-27)

However, Colgan et al. fail to disclose using a sputter to form the black matrix (claims 1&18), gate line (claim 16), data line (claim 17), the pixel (claim 19), and the common electrode (claim 20) by metal layers including one of chromium (Cr), chromium oxide (CrOx), aluminum (A1), aluminum neodymium (AlNd), copper(Cu), molybdenum (Mo), tungsten (W), titanium (Ti), indium-tin-oxide (ITO) and indium-zinc-oxide (IZO) (claim 15), wherein the sputter includes:

(claim 1) a shield mask having an open portion having dimensions larger than the size dimensions of a substrate or

(claim 14) the substrate having size dimensions smaller than size dimensions of the open portion of the shield such that a susceptor under the substrate is partially exposed through the open portion.

(claims 29 & 32) the susceptor under the substrate is partially covered by the shield mask.

Tanaka teaches (figs. 4-6, col. 3, lines 10 – col. 5, line 40) sputtering metal material such as Ti, Al, etc...and compounds (Al alloy) in high aspect ratio openings using a sputter comprising a shield mask 110 with an open portion having dimensions d3 larger than the size dimensions of a substrate 108 such that a susceptor 106 under the substrate is partially exposed through the open portion (Claim 1). The shield 110 extends toward the substrate 108 providing a distance d3. This curved shield 110 protects the sidewalls 113 of the sputtering chamber 100 from deposition, but does not interfere with the magnetic field of the target, as can be seen in FIG. 5. Further, since the shield 110 is constructed so as to be spaced from the target, i.e., about 3 mm above the target sputtering surface, fewer electrons impact the shield 110, with the result that fewer electrons are lost from the plasma, and thus the plasma can be maintained even at very low pressures. As can be seen in FIG. 6, the direction of the electric field vector 114 near the outer periphery of the target 101 becomes much more vertical with respect to the target 101. This shield structure has the further effect that the scattering direction of the atoms or ions of sputtered target material is controlled in the vertical direction with respect to the target 101, particularly near the center of the target 101, and thus more molecules and ions impact the substrate 108 in a vertical direction than in prior art chambers such as that shown in FIG. 1. Doing so the thickness uniformity of the deposited films is thereby improved.

Note that Tanaka sputter also includes the substrate having size dimensions smaller than size dimensions of the open portion of the shield mask (claim 14) such that a susceptor under the substrate is partially exposed through the open portion, and the susceptor under the substrate is partially covered by the shield mask (claims 29 & 32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ Tanaka sputter with set forth above shield mask for forming the black matrix, the gate and data lines, the pixel and common electrodes in Colgan LCD by sputtering metal layers on respective substrates. Doing so would enhance the thickness uniformity of the black matrix, the data and gate lines, the common and pixel electrodes, as taught by Tanaka.

Further more, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize Tanaka sputter for respectively forming the following different layers/lines/electrodes in Colgan LCD for having uniform thickness, as taught by Tanaka:

Claims 3-6: the gate line and data line including one of aluminum (Al), aluminum neodymium (AlNd), chromium (Cr), copper (Cu), molybdenum (Mo), tungsten (W) and titanium (Ti) since they are typical used for lowering resistance metal which does not deteriorate the waveform being transmitted. Also these are conventional material for forming data and signal lines in the LCD device (Tanaka col. 1, lines 10-16).

Claims 7-10: the pixel electrode and common electrode including one of indium-tin-oxide (ITO) and indium-zinc-oxide (IZO) since these are conventional material that are commonly used to form these electrodes due to their high transparency and conductivity characteristic.

Claims 11-13, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US5824197) in view of Mizouchi et al. (US6461485B2)

Claims 11&13.Tanaka teaches (figs. 4-6) a sputter for fabricating process of a liquid crystal display device, comprising:

- a chamber 100;

- a susceptor 106 in the chamber,
- a substrate 108 being loaded on the susceptor;
- a target 101 over the susceptor;
- a magnet 103/104 over the target 101
- a shield mask 101 between the substrate 108 and the target 101, the shield mask 101 having an open portion having dimensions d3 larger than size dimensions of the substrate 108 such that a susceptor under the substrate is partially exposed through the open portion; and (claims 30 & 31) the susceptor under the substrate is partially covered by the shield mask

Wherein

Claim 12: the target includes materials such as titanium, titanium tungsten, titanium nitride, aluminum, aluminum alloys, tungsten, tungsten silicide, molybdenum silicide, silicon and copper and copper alloys (col. 1, lines 10-15)

However, Tanaka fails to disclose a platen under the susceptor for adjusting a height of the susceptor;

It is well know in the art to have a platen formed under the susceptor for adjusting a height of the susceptor, as taught by Mizouchi et al., with the platen 14a under the susceptor 14 (fig. 7) for moving the susceptor 14 up and down to adjust its height.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange a platen under the susceptor 106 in Tanaka sputter for adjusting the susceptor's height, as taught by Mizouchi et al.

Claim 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan et al. (US6057903A) in view of Demaray et al (US6362097B1) and Tanaka (US5824197).

With respect to claim 21, Colgan et al. teach (Figs. 1-2, col. 4, line 25 to col. 5, line 55) a method of fabricating a liquid crystal display device comprising the following steps:

- forming a gate line 32 on a first substrate;
- forming a data line 31 crossing the gate line;
- forming a switching element (TFT 30) connected to the gate line and the data line;
- forming a pixel electrode 26 connected to the switching element;
- forming a black matrix 23-n on a second substrate using a sputter to deposition,
- forming a ITO common electrode 28 on the color filter layer; attaching the first and second substrates such that the pixel electrode faces the common electrode; and
- forming a liquid crystal layer 36 between the pixel electrode and the common electrode.
- forming a color filter layer on the black matrix formed of chromium and chromium oxide (col. 7, lines 24-27)

However, Colgan et al. fail to disclose using five sputters to respectively form the black matrix (claims 21), gate line (claim 22), data line (claim 23), the pixel (claim 24), and the common electrode (claim 25), wherein each of the sputters includes a shield mask having an open portion having dimensions equal to size dimensions of a substrate, where the target is deposit on, such that edges of the open portion correspond to edges of the substrate.

Demaray et al. teach (Fig. 2) a method of sputtering semiconductor and other films including metal film to form a liquid crystal display device, ultilizing a sputter comprising:

- a chamber 10;
- a susceptor 26 in the chamber,
- a substrate 16 being loaded on the susceptor;
- a platen under the susceptor, the platen adjusting a height of the susceptor;
- a target 14 over the susceptor;
- a shield mask 22 between the substrate 16 and the target, the shield mask with an open portion having dimensions equal to size dimensions of the substrate 16 such that edges of the open portion correspond to edges of the substrate 16 to prevent sputtered material from being deposited on the chamber walls (col. 5, lines 63-65)

However, Demaray et al. fail to disclose a magnet over the target.

It is well known in the art to employ a magnet over the target of a sputter to creates a magnetic field about the outer circumference of the target that confines the plasma to the space above the susceptor. As shown in FIG. 1B of Tanaka reference, the magnet pair 21 forms an orthogonal electromagnetic field 22, shown in dashed lines, between the target 13 and the susceptor support 16, enhances the plasma density and improves sputtering efficiency, e.g., increases the deposition rate without adversely affecting the quality of sputtered films (col. 1, lines 29-36).

Therefore, it would have been obvious to one of ordinary skill in the art to use a magnet over the target 14 of the sputter disclosed by Demaray et al to enhance the plasma density and improves sputtering efficiency, e.g., to increases the deposition rate without adversely affecting the quality of sputtered films, as taught by Tanaka.

Further more, it would have been obvious to one having ordinary skill in the art at the time Colgan LCD device was fabricated to use five sputters, as taught by Demaray in view of Tanaka as set forth above, to respectively form the black matrix (claims 21), gate line (claim 22), data line (claim 23), the pixel (claim 24), and the common electrode (claim 25), wherein each of the sputters includes a shield mask having an open portion having dimensions equal to size dimensions of a substrate, such that edges of the open portion correspond to edges of the substrate for preventing sputtered material from being deposited on the chamber walls (col. 5, lines 63-65), as taught by Demaray, and for enhancing the plasma density and improves sputtering efficiency, as taught by Tanaka.

Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Demaray et al. (US6362097B1) in view of Tanaka (US 5824197).

Demaray et al. teach (Fig. 2) a method of sputtering semiconductor and other films including metal film for a liquid crystal display device, ultilizing a sputter comprising:

- a chamber 10;
- a susceptor 26 in the chamber,
- a substrate 16 being loaded on the susceptor;
- a platen under the susceptor, the platen adjusting a height of the susceptor;
- a target 14 over the susceptor;
- a shield mask 22 between the substrate 16 and the target, the shield mask having an open portion having dimensions equal to size dimensions of the substrate 16 such that edges of the open portion correspond to edges of the substrate 16;

However, Demaray et al. fail to disclose a magnet over the target.

It is well known in the art to employ a magnet over the target of a sputter to creates a magnetic field about the outer circumference of the target that confines the plasma to the space above the susceptor. As shown in FIG. 1B of Tanaka reference, the magnet pair 21 forms an orthogonal electromagnetic field 22, shown in dashed lines, between the target 13 and the susceptor support 16, enhances the plasma density and improves sputtering efficiency, e.g., increases the deposition rate without adversely affecting the quality of sputtered films (col. 1, lines 29-36).

Therefore, it would have been obvious to one of ordinary skill in the art to employ a magnet over the target 14 of the sputter disclosed by Demaray et al to enhance the plasma density and improves sputtering efficiency, e.g., to increases the deposition rate without adversely affecting the quality of sputtered films, as taught by Tanaka.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Green et al (US 6951596 B2) disclose in one preferred embodiment in which the antenna is formed by metallic sputter coating, the sputtering occurs on a 16 in.times.6 in square target at a sputter distance of 4-5 in with a copper or aluminum target at a web speed of up to 1 ft/min and a web width of 6-10 in. Various alternatives exist for masking. In a first alternative, masking is applied on the substrate followed by removal after sputtering. In a second alternative, a pattern is masked on the web back coated with PSA, which laminates to the substrate immediately before sputtering, then stripping immediately after sputtering. In a third alternative, a permanent mask is used that is very close to the substrate web (1 cm or less) so that the divergence of sputter is minimized.

Zhang et al (US6847422 B2) disclose a liquid crystal display device formed by sputtering method with films 33, 34 having the Ti/Al/ITO multi-layered structure formed in the peripheral circuit portion B, while only the single-layer transparent conductive film 33 is formed in the display portion A.

Baldwin et al (US 6610179 B2) disclose a system and method for controlling deposition thickness using a mask with a shadow that varies with respect to a target of a sputter.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Julie-Huyen L. Ngo whose telephone number is (571) 272-2295. The Examiner can normally be reached on Monday-Thursday.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's Supervisor, Mr. Frank Font can be reached at (571) 272-2415.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1562.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

huyen

March 15, 2006

Julie -Huyen L. Ngo
Primary Examiner
Art Unit 2871